COMMONWEALTH of VIRGINIA

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MEMORANDUM

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VDOT, attn: Christopher Adkins
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Dominion, attn: Kenneth Roller
NOAA, attn: Kerry Kehoe
EPA, Region 3, attn: Jon Capacasa

cc. Localities: Louisa, Spotsylvania, Orange, Caroline, Hanover, and King William Counties and the Town of Mineral

FROM: Ellie Irons, DEQ-OEIR

DATE: April 11, 2011

SUBJECT: Nuclear Regulatory Commission (Dominion Virginia Power, applicant): Federal Consistency Certification for Combined Construction and Operating Permit for Proposed Unit 3 at North Anna Power Station (DEQ-10-167F)

DEQ is currently coordinating the Commonwealth's review of a federal consistency certification (FCC) submitted by Dominion Virginia Power. The proposed action is Dominion's construction and operation of a third nuclear reactor unit at its North Anna Power Station, adjacent to Lake Anna in Louisa County. Dominion has received an Early Site Permit from the Nuclear Regulatory Commission (NRC) which authorized site preparation activities for an additional reactor, referred to as Unit 3. Dominion has recently applied to NRC for a Combined Construction and Operating License for the proposed reactor; this federal process requires a new FCC, which is now under review by state agencies. The Coastal Zone Management Act mandates public involvement in the state's review process.

We are sharing the comments we received from the public with agencies administering the relevant enforceable and advisory policies of the Virginia Coastal Zone Management Program (VCP), and asking those agencies to address particular groups of issues raised by commenters, in keeping (broadly) with their mandates.

During the public comment period, DEQ received several comments on issues which are not addressed by the enforceable policies of the VCP. The Friends of Lake Anna has requested that DEQ forward issues which are not covered under VCP policies to appropriate agencies. For this reason, we have included your agency on the list of agencies to receive this memorandum.

Please review the information provided and/or referenced in this memorandum and if you wish to comment on issues which relate to the policies and expertise of your agency, please do so by **April 26, 2011**. The summaries which follow are intended to guide your analyses but not to limit them. Please send comments, if any, to: Ellie Irons at the Department of Environmental Quality, Office of Environmental Impact Review, 629 East Main Street, Richmond, Virginia 23219, email: ellie.irons@deq.virginia.gov The comments have been organized into the following topic areas:

Topic Area #1 – Health impacts of hot water discharge and chemicals.
Topic Area #2 – Nuclear safety and related matters including the Japan disaster
Topic Area #3 – Overall planning and anticipated resource demands
Topic Area #4 – Impacts on Louisa County's Infrastructure and Resources
Topic Area #5 – Use Dry Cooling for Unit 3

Topic Area #1. Health impacts of hot water and pollutants.

(a) Hot water discharge from reactors. FOLA was joined by at least 6 individual commenters in stating concerns that Dominion has discharged water from Units 1 and 2 that exceeds 104 degrees Fahrenheit (F.) in summer months. According to FOLA, the addition of Unit 3 would exacerbate the existing problem. FOLA asks what the impacts would be on human health, inasmuch as the heated water is associated with increased water demand for reactor cooling in the summer. A second commenter indicates that Dominion continues to discharge water from Units 1 and 2 into the Lake at temperatures greater than 89 degrees F. FOLA states that high water temperatures allow for increases in bacterial growth and contamination by *e. coli* and also *naegleria fowleri*, a potentially fatal amoeba which proliferates at temperatures of 86 degrees F. and thrives at temperatures between 95 and 113 degrees. This commenter cites a Virginia Commonwealth University study (June/September 2006) which found that *n. fowleri* was present in the cooling lagoons and the main reservoir of the Lake. He states that thermal pollution has not been addressed.

Another commenter stated that she lives on the Lake shoreline and that the water temperature at the end of her dock is often over 100 degrees F. in August or even July. Many fish, including bass, blue gills, and catfish can be found floating "all over the place" during August. Often the hydrilla (a water plant) flourishes. The hot water sometimes scalds the skin if one goes swimming. The commenter indicates that these conditions do not even take Unit 3 into account (since it is not yet built or permitted).

(b) Adding toxic substances to Lake Anna. FOLA cites Dominion's application statement as stating that Dominion plans to add concentrations of copper and tributyltin to the waste water discharge into the cooling lagoons as a result of Unit 3 cooling, (which does not currently exist), and that the concentrations of these pollutants would not be measurable using VDEQ analytical methods. In addition, Dominion plans to add chemicals and/or biocides that are commonly used for water treatment (e.g., for chlorination and /de-chlorination, anti-scaling, and corrosion protection). FOLA urges that the FCC include a condition that protects the public: that the effects on human health, fish, wildlife, and aquatic life (when these chemicals are added to heated water where the public recreates) should be known; and that appropriate limits must be placed on discharges of these pollutants.

Topic Area #2. Nuclear safety and related matters including the Japan disaster.

(a) The Japan connection. A number of commenters raised concerns about the addition of a third reactor at Lake Anna in light of the disaster at the nuclear energy plant in Japan. In the words of several, the earthquake in Japan and the resulting breach to the Fukushima nuclear reactor containment building, the possibility of a meltdown, and the continuing release of radioactivity is cause for alarm. The permits and certifications by NRC and DEQ need to be put on hold until the environmental impacts associated with the Japanese reactor are evaluated and understood, according to at least 15 commenters. Several went further: the U.S. needs to develop lessons learned and incorporate them into future environmental studies, water permits, and federal consistency certifications so as to ensure the health, safety, and welfare of the 3 million annual visitors and residents of Lake Anna. Another commenter does not think the Japan situation would happen here, but that people and systems are always fallible and it is ridiculous to think we can anticipate all the possible ways a reactor could be compromised. Still another said that the Japan experience shows the difficulties of clustering reactors together at one site.

(b) Nuclear waste disposal. Two commenters said that the waste disposal problem of spent nuclear fuel is not solved for the 100,000 years-plus of half life in which it can injure living tissue; that is a "bargain of power for about 30 years and potential injury for over 100 millennia," according to one of the commenters. Both said the bargain appears unethical to them. Two commenters urged that an environmental impact review be accomplished with regard to high-level nuclear waste storage at the North Anna Power Station, since the federal government failed in its obligation to remove that waste. In addition, low-level nuclear wastes are still stored at the facility because of the collapse of an interstate compact, and a review should cover these wastes, since no credible time frame for removal of low-level waste has been submitted.

(c) Emergency cooling needs. According to FOLA, computer modeling for the North Anna plant assumes there will always be enough water to cool the reactors. It does not take into account the possibility of an earthquake of greater than the designed values of the container buildings, along with an earthquake or attack causing a breach of the North Anna Dam, causing most or all of the water in Lake Anna to drain from the lake. The remaining on-site pond meant to supply cooling water to Units 1 and 2 would not necessarily have enough water to do so or to cool Unit 3 in addition. Moreover, it is not certain where the earthquake fault line runs, although one commenter states that in Charlottesville, she and her neighbors receive aftershocks from earthquakes originating in the Mineral area near the Lake. It is also

not certain, according to commenters, whether there is a back-up plan for the generators that power the pumps providing cooling water, if needed to safely shut down the reactors.

FOLA later cited a Nuclear Regulatory Commission calculation of the likelihood of nuclear reactor containment failures attributable to earthquakes ("Letter to the Editor," sent to DEQ on March 28). The list, covering 104 nuclear power stations in the nation, ranked the North Anna Power Station 7th in the nation, with a one in 22,727 (1:22,797) chance of a catastrophic earthquake. By way of comparison, the most susceptible power station was Indian Point 3 in Buchanan, New York, with a 1:10,000 chance. The Three Mile Island plant near Harrisburg, Pennsylvania was ranked 10th, with a 1:25,000 chance.

(d) Solar strike. One commenter mentioned recent news coverage of the possibility of a "solar strike," due to high sunspot activity in coming years that knocks out external power to the nuclear plant. The plant would automatically shut down, but the cooling system would have to be kept going for days or weeks to prevent a meltdown of the nuclear core. Units 1 and 2 might not require external power, but proposed Unit 3 might.

(e) Radioactive waste storage. Two commenters pointed out that both low-level and high-level radioactive wastes are stored at the power plant, and are likely to stay there for another 50 years, given the failure to approve a federal waste site. They urge an environmental review of this continuing storage. The Virginia chapter of the Sierra Club indicates that there are no plans for the safe removal of this nuclear waste, and adds that the rate of cancers, especially childhood cancers, is higher near nuclear reactors than it is in other areas.

(f) Virginia Earthquake Zone. FOLA states that during the past several years, Virginia has experienced many different earthquakes, and asks the following questions about them:

(1) How many were predicted at the quake locations?

(2) Where does the current computer modeling forecast the earthquake fault line in relation to Lake Anna?

(3) Does Virginia have an experienced seismologist on staff or are we relying solely on data submitted by Dominion to define the earthquake fault line in relation to the North Anna site?

(4) What earthquake magnitude have the containment buildings for reactors 1 and 2 been designed to withstand?

(5) In light of the Japanese disaster, how have these projected earthquake magnitudes been updated?

(6) What is the current backup plan at Lake Anna if both the electric and backup generators fail and they cannot power the pumps to provide cooling water to safely shut down the reactors?

(7) Does Dominion have sufficient fire-trucks on site that could easily be brought into service to help cool down all 3 reactors at the same time in the event of a disaster?

(8) How have these emergency plans been updated to incorporate more on-site pond water to also safely shut down the proposed 3rd reactor, when the design of the 3rd reactor will not be completed until sometime in 2013?

According to FOLA, these and many other environmental and safety questions should be responsibly answered and briefed to the public, with comments solicited before proceeding with Consistency Certifications and permits for the proposed 3rd reactor.

Topic Area #3. Overall planning and anticipated resource demands.

Public comments centered on present and future competing needs for water from the Lake Anna watershed, the lack of unified consideration of those needs, and how the proposed construction of Unit 3 would affect or impede their fulfillment.

(a) Comprehensive planning in the area. One commenter wrote that he was alarmed at the multiple developments around Lake Anna that announce broad plans to use the water for sewage, drinking water, and other needs. Each announcement justifies a project individually, with anecdotal reference to impacts, and presents its case to the most favorable approval authority, according to this commenter. Adding these developments to the Dominion plan without comprehensive oversight will affect the environmental quality of Lake Anna and the surrounding area. This person recommends an area plan to identify future developments, evaluate their impact on the Lake Anna area, and manage the situation with a monitoring manager. An authority should approve developments, with penalties for non-compliance with the plan.

(b) Downstream demands. Two commenters made reference to anticipated downstream water demands from Hanover County, the new State Fairgrounds therein, and possible expansion of King's Dominion; these and other things like agricultural expansion must be considered in reviewing the federal consistency certification for Unit 3. Moreover, since the Nuclear Regulatory Commission is not expected to review the combined construction and operating license until 2013, the commenter wants to know what the hurry is with regard to the matter.

(c) Additional stakeholders. According to two commenters, other stakeholders have not been fully considered. These include the following:

(1) Water needs of several counties – Louisa, Spotsylvania, Orange, and Hanover. These counties may need water from Lake Anna for drinking, fire suppression, and other purposes.

(2) Agricultural interests, both around the lake and downstream along the North Anna River and into the York River basin.

(3) Commercial interests, specifically the Virginia State Fair, which relies on downstream flows from Lake Anna, and (according to another commenter), potential expansion of the King's Dominion amusement park in Hanover County.

(4) Residential communities, which may need drinking water from the Lake and downstream flows.

In addition, one commenter indicated that if the plant is approved, electric rates will rise quickly and dramatically according to a formula approved by the General Assembly, and that such a rise in electricity costs will have a chilling effect on economic competitiveness.

(d) Planning efforts sought. FOLA commented that the cumulative effects of water withdrawals for construction and operation of the third reactor, a new sewage treatment plant for 5,000 - 7,000 construction workers, and Louisa County's request for Lake Anna water for human consumption require that DEQ and DCR conduct a comprehensive impact study before proceeding with any permits. This study should consider factors affecting water temperature, water usage, and impacts of both upon the Lake Anna environment.

FOLA also seeks a meaningful Lake Anna water management plan developed by the Commonwealth for maintaining water levels in the Lake. The plan would involve maintenance of the water levels of the cooling lagoons and main reservoir, using up-to-date technology and requiring automatic reporting of water levels when the main reservoir level is at 250 feet MSL or above. If the main reservoir falls below 250 feet MSL, then the cooling lagoons must be lowered by the same number of inches from 251.5 feet MSL.

(e) Assistance with County growth. FOLA urges that Dominion be required to provide money to Louisa County, if the company gains permission to build the third reactor, to provide for new schools and other local services that will be needed because of planned construction and its increases in population and need for services. FOLA states that Dominion received federal money to assist with the processing of the Early Site Permit for Unit 3, so they should not be allowed to burden Louisa County taxpayers. Similarly, FOLA asks that Dominion construct a sewage treatment facility, rather than using portable facilities and putting the waste in the existing sewage treatment plant. There is time to do this rather than burdening the county with extra sewage discharges into Lake Anna from the portable facilities because of Dominion's deferred decision on Unit 3 (until two or three years hence).

Topic Area #4. Impacts on Louisa County's infrastructure and state resources.

Public comments, principally from FOLA, addressed the impacts of a third reactor upon the infrastructure of Louisa County and Lake Anna surroundings.

***(a) Height of dry and wet cooling towers and facility buildings*.** This height should not exceed the tree line, to protect the rural aesthetic atmosphere of the community (as Dominion indicated in a January 2006 stakeholder meeting).

(b) Impact on Roads and Schools. The impacts of employing 5,000 to 7,000 new workers (construction, periodic maintenance, professional) for 5 years on local roads and schools should be analyzed. This influx of additional people, as well as construction of three newly approved Louisa County subdivisions for about 1800 new homes in close proximity to the plant, will create the need for new expanded roads before the project begins. Since Dominion said it will not make a decision to build the 3rd reactor for another couple of years, FOLA recommends that Dominion provide sufficient monetary incentives to both Louisa

County and the Virginia Department of Transportation to enhance the existing road system prior to beginning construction so the additional workers do not have an adverse effect on the local population and increase the tax burden upon local taxpayers.

(c) Other Local Services (police, fire, rescue squads, etc.). According to FOLA, other local infrastructure should be planned and built prior to any new tax levies on the local population. Louisa and Spotsylvania are among the fastest growing counties in the U.S. Louisa's population increased 29% between 2000 and 2010, while the Commonwealth of Virginia only increased 13% during this time period. Since Dominion said it will not make a decision to build the 3rd reactor for another couple of years, FOLA asks that Dominion provide sufficient monetary incentives to Louisa County to improve local public services prior to beginning construction so that Dominion's workers do not adversely affect the local population or increase its tax burden.

(d) Updated emergency evacuation plans on the small two-lane roads surrounding the power plant. There is a need for an expanded road system to accommodate new workers and subdivisions. FOLA recommends that, prior to beginning construction, Dominion provide sufficient monetary incentives to Louisa and Spotsylvania Counties to enhance the current evacuation plans, including necessary improvements to existing infrastructure. The purpose would be, again, to ensure that Dominion's workers do not adversely affect the local population or increase its tax burden.

***(e) Impact of additional fog and icing from wet cooling towers*.** The potential impact of additional fog and icing from wet cooling towers on local roadways is a major concern. According to FOLA, additional fog and icing will result from the 3rd reactor wet cooling towers, affecting people using local roadways. Dominion should provide sufficient monetary incentives to Louisa County and to the Commonwealth of Virginia to defray the additional cost associated with maintaining safe public roadways.

(f) Movement of excavated wetland material on Virginia Roads to a dump site. FOLA asks the following questions:

(1) How is DEQ coordinating with Louisa County and the Virginia Department Transportation to ensure that a bond is posted to cover the cost of any damage to Virginia roads (to be paid for by either Dominion or the bonding company) which results from moving heavy excavated material?

(2) Will extra traffic enforcement be required for this wetland material movement?

(3) How has DEQ coordinated with the local Louisa officials to mitigate this activity, and what provisions have been made for Dominion to pay for any additional law enforcement that is needed?

(g) Large Component Transport/ Impacts to both Mattaponi River and Virginia roads. FOLA questions why the existing rail line to the nuclear plant is not being used to transport all large components, as opposed to impacting both the Mattaponi River and Virginia roads. Rail lines are designed to accommodate major loads, while all of the small two lane roads in rural Virginia are not. FOLA anticipates damage to such roads from heavy loads and impacts on traffic flow. DEQ permits should include provisions which ensure that a bond is

posted, that the applicant pays for any road damage, and that the damage does not become a tax burden for Virginia taxpayers.

Topic Area #5: Alternative Methods for Cooling Unit 3.

(a) Dry Cooling only for Unit 3. On March 15, 2011 (after the earthquake in Japan), FOLA submitted additional comments on the FCC. According to FOLA, the potential for dual disasters (e.g., an earthquake and the failure of back-up electric generators, making it impossible to pump cooling water and safely shut down reactors) striking the existing and proposed nuclear power plants at North Anna dictates that the proposed 3rd nuclear reactor should be cooled exclusively using dry air cooling (similar to Dominion's proposal for its 4th reactor during the Early Site Permit processing). Using dry air cooling would ensure that at a minimum one nuclear reactor (Unit 3) would still be operational if the lake were drained because of a dam breach and there was insufficient water in the lake to provide for cooling reactors 1 and 2. Note that the 1970 plans by Dominion for the North Anna Power Station indicated that it would take approximately 3 years to fill Lake Anna, since it is not adjacent to a free flowing river or ocean. This is also the approximate time period that all three reactors would be out of service if Unit 3 reactor cooling is not changed to dry cooling and a dual disaster were to strike the North Anna site.

(b) Use less Water for cooling. If Dominion were to use less water by employing the dry cooling mode for the 3rd unit more during the extreme summer, and they provided for Unit 3 (Maximum Water Conservation Mode) to give "operational flexibility during different times of the year," this approach could compensate for the approximately 25% of the time that the proposed 3-inch rise would not maintain the water levels at the existing surface elevations to dissipate the heat from Units 1 and 2.

(c) Reduce the heat discharged from the current two reactors and maintain lake design water levels in the cooling lagoons. During the past 4 years various Lake Anna organizations have met with Dominion, together with Louisa and Spotsylvania County officials, to encourage Dominion to adopt different techniques for reducing the high water temperatures from Units 1 and 2 discharges (at times over 104 degrees F. during the summer months when the public recreates) and also maintaining lake design water levels in the cooling lagoons. In all cases, Dominion acknowledged the technique, but never adopted any of them which would help in mitigating the problem. These techniques included:

1. Piping cool water (approximately 60 degrees F. in July, August, and September, caused by a thermocline) from the bottom of the lake (close to the dam) up the lake bed to the current two reactors to assist with the cooling.

2. Taking some of the heated discharge waters and spraying them in the discharge canal, so they would cool further before entering the first cooling lagoon.

3. Expanding the cooling towers for the 3rd reactor to provide for additional cooling of Units 1 and 2.

4. Reducing the heat output from Units 1 and 2 during a part of the summer months when the lake water exceeds unhealthy temperatures. Note that 99% of the discharged water re-circulates from the power plant through the cooling lagoons to

Dike 3 and returns upstream in the main reservoir to the power plant for another cycle. Only 1% of the water goes over the dam and downstream. As a result, on each cycle the heated water gets hotter and hotter over the summer to reach unhealthy temperatures.

5. Keeping more water in the cooling lagoons of the lake to dissipate the heat and preserve more water in Lake Anna when we have abundant rainfall to compensate for the 3-year interval droughts we have been experiencing during the past decade. Automated technology available in 2011 could easily maintain and synchronize the Design Water Levels of 251.5 feet MSL in the cooling lagoons with the design water level of 250 feet MSL in the main reservoir (and similar fluctuations) by having automated locks (similar to those in canals/rivers throughout the U.S. and Europe.) These locks would control water flow at Dike 3 in coordination with turning pumps on and off that can circulate 2 million gallons of water per minute from Units 1 and 2; and the formula could be adjusted to accommodate the discharge from Unit 3.

6. Keeping more water in the cooling lagoons by using 1960's technology to manually insert or remove existing stop logs at Dike 3 in coordination with turning the circulating pumps on and off as indicated in item 5 above.

7. Eliminating the 100 hours of Dominion-requested time (in the water withdrawal request for Unit 3) to not operate the dry cooling mode (MWC) regardless of the lower lake level, which will only increase the water usage and increase water temperatures during the summer months when the public recreates on the lake and possibly create additional heat trauma to the public, fish, wildlife, and aquatic life.

In FOLA's judgment, the Virginia State Water Control Board should ensure that monitoring of compliance with the VPDES permit provisions begins at the end of the North Anna power plant discharge canal to protect the public.

Finally, FOLA believes that the U.S. Environmental Protection Agency (EPA) should re-evaluate the NPDES authority delegated to the Commonwealth of Virginia and ensure that the VPDES program is not less stringent than the national program. Federally delegated programs such as VPDES can be more stringent than the national program, but cannot be less.

The detailed public comments can be found at:
http://www.deq.virginia.gov/eir/majfederal.html